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| 10/583,523 | 07/24/2007 | Masum Choudhury | A5-013 US | 1436 |

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MOLEX INCORPORATED
2222 WELLINGTON COURT
LISLE, IL 60532

| EXAMINER | |
|---|---|
| BEDTELYON, JOHN M | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2874 | |

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| 09/16/2009 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/583,523 | CHOUDHURY ET AL. | |
| | Examiner | Art Unit | |
| | JOHN M. BEDTELYON | 2874 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *27 July 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,3-8,10-14,16,19 and 20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-8,10-14,16,19 and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 November 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *07/27/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 07/27/2009 and 07/23/2009 have been entered.

### *Response to Amendment*

2. This action is responsive to the amendment and remarks submitted 07/23/2009 and the Request for Continued Examination (RCE) and Information Disclosure Statement (IDS) submitted 07/27/2009. Claims 1, 8, and 14 are amended. Claims 2, 9, 15, 17, and 18 are canceled. No claims are newly added. Claims 1, 3-8, 10-14, 16, 19, and 20 are currently pending in the Application.

### *Information Disclosure Statement*

3. The information disclosure statement (IDS) submitted on 07/27/2009 is being considered by the examiner.

### *Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 3, 4, 7, 8, 11-14, and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Luo et al. (US Patent 7,251,406, hereinafter Luo). Luo teaches:

**Claims 1 and 8**: a planar waveguide (204); and

a tapered waveguide extension (205) formed at an end of the planar waveguide for coupling light between the planar waveguide and an optical fiber (see figure 2a), the waveguide extension having a core (206, 207) formed of a single material on a planar substrate structure (201), said core having first (upper right side of portion 205, as seen in figure 2a) and second (lower left side of portion 205, as seen in figure 2a) ends, a top surface (uppermost surface), side surfaces (side edges of 206) and a flat (bottommost surface), planar bottom surface opposite said top surface and positioned adjacent said planar substrate structure (see figure 2a), a predetermined plurality of steps (see figure 2a, the steps formed by portions 206 and 207) formed into the top surface by dry etching (column 8, lines 49-51) the waveguide extension so as to vertically and horizontally taper said waveguide extension between the first and second ends (see figure 2a), each of the steps having predetermined height and length, and the side surfaces (sides of 206) being smooth from the first end of the waveguide extension to a second end of the waveguide extension to create a single, uniform, horizontal taper (see figure 2a, the side surfaces of portion 206 have a single, uniform, and smooth taper from the first to the second end).

**Claim 3:** wherein the vertical and horizontal tapers narrow at the same end of the core (see figure 2a).

**Claims 4 and 11**: the device further comprising a dielectric cladding layer (202, column 8, lines 63-66) formed over the core (see figure 2a).

**Claims 7 and 12**: further comprising dielectric layers formed under and over the core, wherein the dielectric layers each have a refractive index that is lower than the refractive index of the core (202 and the corresponding upper cladding, not shown in the figures, column 6, lines 31-43).

**Claim 13**: further comprising the optical fiber (208).

**Claim 14**: (a) providing a planar substrate material (201),

(b) forming a core layer (203) of core material for the tapered waveguide on the planar substrate material, said core laver having first (upper right end as seen in figure 2a) and second (lower left end as seen in figure 2a) ends, a top surface, and a flat, planar bottom surface opposite said top surface:

(c) forming said first and second ends of the core layer so that the first end is wider than the second end (see figure 2a);

(d) forming sidewalls (sides of layer 206) of said core laver so that they are smooth and extend between said first end and said second end to create a single, uniform, horizontal taper between said ends (see the sides of layer 206);

(e) applying a protective layer (mask) over a predetermined area of the core laver extending from the first end towards the second end to define a protected area and leaving an unprotected area on said core layer;

(f) dry etching (column 8, lines 49-62) the unprotected area of the core laver to a predetermined depth defining a step having a height without etching through said single core material (see figure 2a); and

(g) repeating steps (e) and (f) a predetermined number of times, each time extending the protected area farther from the first end to define a length of a new step so as to form a predetermined number of steps in the top surface of the core layer so as to vertically taper said core layer, each step having a predetermined height and a predetermined length (column 8, line 33 – column 9, line 28, and column 15, lines 16-22, these lines teach using etching and masking to fabricate the device of figure 2a, which would necessarily include etching unprotected parts of the waveguide, also see figure 6 which discloses repeating the masking and etching steps to create new steps).

Claim 16: wherein the step of providing said substrate further includes: providing said substrate with a dielectric layer (202) formed on the substrate, and the core layer (203) being formed on the dielectric layer (see figure 2a).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 5, 6, 10, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Luo.

**With respect to claim 5**, Luo teaches the limitations of claim 1 as previously stated and wherein the planar substrate structure includes a dielectric layer (202) formed over a substrate (201).

Luo is silent to the substrate (201) being made of a semiconductor material.

The Examiner takes official notice that the use of a semiconductor material, particularly silicon, as the material for substrates is well known in the semiconductor substrate art with the benefit of being durable and cheap.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the substrate (201) in the Luo device out of silicon, a well known semiconductor material, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. One of ordinary skill in the art would be motivated to use silicon as the material of the substrate because it is a cheap and durable material.

**With respect to claims 6 and 10**, Luo teaches the limitations of claims 1 and 8 as previously stated. Luo is silent to the core being made of crystalline silicon.

The Examiner takes official notice that it is well known to use crystalline silicon glass as the material of the waveguide core in the optical waveguide art, because it has the benefit of being easy to manufacture and is capable of propagating optical signals with minimal losses.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use crystalline silicon as the material of the core in the waveguide, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. One would be motivated to use crystal silicon as the material for the core because it is easy to manufacture, and is capable of propagating optical signals with minimal losses.

**With respect to claims 19 and 20,** Luo teaches the limitations of claim 14 as previously stated.

Luo is silent to the polishing of the wider end of the tapered waveguide or the applying an anti-reflective coating at the wider end of the tapered waveguide.

The Examiner takes official notice that the act of polishing and applying anti-reflective coatings to optical fiber connection points is well known in the optical waveguide art and is useful for lowering the amount of unwanted back reflections, which reflect light back into the optical fiber at connection points.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to polish and apply an anti-reflective coating to the wider end of the tapered waveguide because in doing so, unwanted back reflections causing signal attenuation can be reduced, increasing efficiency of the device using a simple and low cost method.

***Response to Arguments***

9. Applicant's arguments filed 07/23/2009 have been fully considered but they are not persuasive. The Examiner has thoroughly reviewed Applicant's arguments but believes the cited reference to fully and completely meet the claim limitations.

Applicant argues that in the Luo reference, the decrease of the upper and lower portions of the guiding layer, as well as the wings, are not in a smooth, uniform and horizontal taper between the first end and the second end of the guiding layer, as required by the Independent claims of the present application. The upper and lower portions (206 and 207, respectively), do not decrease in smooth, uniform and horizontal width through the entirety of the guiding layer, as portion 206 and 207 decrease in width at differing angles having different widths. These widths, Applicant argues, run contrary to that which is specifically required by the Independent claims of the present application, as amended, as illustrated most clearly in Figure 3, the singular width of the core decreases from W1 to W2 in a uniform manner, i.e., in one, single continuous decreasing line.

The Examiner respectfully disagrees. Firstly, in response to Applicant's argument that Luo does not teach the limitations of the Independent claims of the

present application, including the singular width of the core decreases from W1 to W2 in a uniform manner, the limitations on which the Applicant relies (a singular width of the core) are not stated in the claims. It is the claims that define the claimed invention, and it is the claims, not specifications that are anticipated or unpatentable. Instead, the independent claims only require that said core has side surfaces and the side surfaces being smooth from the first end of the core to the second end of the core to create a single, uniform, horizontal taper. As outlined in the Final Rejection and above, the side surfaces (referred to as sidewalls in claim 14) of the core are interpreted as only the side surfaces of portion 206, and do not include the side surfaces of portion 207. To wit, Luo Figs. 2a and 2b disclose that the side surfaces of portion 206 are smooth from the first end of the core to the second end of the core to create a single, uniform, horizontal taper which fully meets the claimed limitations.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN M. BEDTELYON whose telephone number is (571)270-1290. The examiner can normally be reached on Monday - Friday, 10:00am - 6:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Uyen-Chau Le can be reached on 571-272-2397. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John M Bedtelyon/
Examiner, Art Unit 2874

/UYEN-CHAU N. LE/
Supervisory Patent Examiner, Art Unit 2874